REMARKS

Claims 1-10 have been cancelled, and Claims 20-22 have been added. Reconsideration is respectfully requested.

An Associate of Power of Attorney is attached.

The Specification and Claim 11 have been corrected as required in the Office Action. The specification and Claim 11 have also been amended to correct obvious minor typographical errors.

Claims 11-22 recite that an alignment mark on a semiconductor wafer is aligned with a bright spot created on a mask by irradiating the mask. This exemplary feature of Claims 11-22 has not been found to be taught or suggested in the applied references.

More specifically, Trutna, Jr. U.S. Patent No. 4,631,416 discloses in Figure 3 an alignment method in which light is diffracted from a grating 32 on a mask 31 to a grating 34 on a wafer 33, and back through the mask grating 32 to produce a set of output diffraction orders 310. The zero order output beam is detected, and its intensity is used to adjust alignment (see lines 15-30 and 48-54 of column 7, and lines 1-8 of abstract). Thus, the alignment process disclosed in Trutna, Jr. relies solely on the intensity of an output diffraction order produced by optical cooperation of the gratings 32 and 34. There is no aligning of a bright spot on the mask 31 with an alignment mark on the wafer 33. In fact, there is no alignment mark on the wafer 33. The Office Action has mistakenly concluded

that Figure 10A of Trutna, Jr. illustrates alignment marks on a wafer. However, Figure 10A actually illustrates a two-dimensional example of the grating 34 on wafer 33, and Figure 10B is a two-dimensional example of grating 32 on mask 31 (see lines 8-10 of column 7 and line 62 of column 12 through line 2 of column 13). Accordingly, Trutna, Jr. fails to teach or suggest the aforementioned exemplary feature of Claims 11-22.

Hopewell U.S. Patent No. 5,124,927 discloses in Figure 2 an optical system which permits accurate location of a wafer 20 relative to a stepper 34. In order to accomplish the desired alignment, the apparatus utilizes registration marks and verification marks that have been produced on the wafer 20. In particular, a latent image of verification marks 30 imprinted on a layer of photoresist is employed for alignment purposes. The latent image (see also Figure 4A) can be produced by exposing the wafer 20 to high frequency light energy such as in the deep ultraviolet region of the spectrum. Figure 3 illustrates a source 96 for producing such high frequency energy in order to expose the photoresist on the wafer 22 to produce the latent image. The apparatus of Figure 2 then utilizes a lower frequency light source in the near ultraviolet region in order to observe the latent image. In this manner, the photoresist can be altered by the high frequency exposure to produce the latent image (see also Figure 4A), while the low frequency light source that is used to view the latent image does not alter the photoresist, but does permit detection of the verification marks.

Referring to Figures 2 and 4A, the low-frequency beams 86 and 88 impinge upon different parts of the transition region of the depression in the photoresist that defines the verification mark. As a result, the optical path links of these two beams 86 and 88 will differ as they are reflected back toward the prism 54 of Figure 2. This difference in optical path links results in a differential phase shift for the beams 86 and 88 as they are reflected back toward the prism 54. Accordingly, the optical system 32 of Figure 2 is responsive to the beams 86 and 88 for producing an image such as illustrated in Figure 4B. The positive peak 126 corresponds to the transition slope 126A of Figure 4A, and the opposite peak 128 corresponds to the transition slope 128A of Figure 4A. The above-described characteristics of Hopewell are disclosed in more detail at: lines 23-54 of column 2; lines 5-40 of column 7; and line 33 of column 8 through line 42 of column 9.

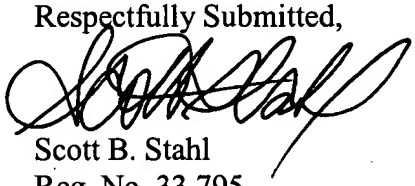
It should be clear from the foregoing discussion and the above-cited portions of Hopewell that the apparatus in Hopewell does not align a mark on a wafer with a bright spot produced by illuminating a mask. In particular, the alignment apparatus of Figure 2, which is used to detect the latent image of the verification marks on the wafer, does not utilize a mask, much less a bright spot created on a mask. Rather, the reflected beams 86 and 88 are utilized to produce an image as illustrated at Figure 4B. With respect to the reticle 94 shown in Figure 3, this is used to produce the latent images of the verification marks on the wafer 20 (see line 41 of column 7 through line 6 of column 8), and is not used in the detection and alignment procedures performed by the FIGURE 2 apparatus.

In view of the foregoing discussion, it is respectfully submitted that neither Trutna, Jr. nor Hopewell teach or suggest the aforementioned exemplary feature of Claims 11-22. This exemplary feature has also not been found to be taught or suggested in Adams U.S. Patent No. 5,968,693 or Feldman U.S. Patent No. 4,037,969.

In view of the foregoing, all pending rejections are believed overcome, and withdrawal thereof should now be in order.

Any inquiries regarding this paper may be directed to the undersigned attorney at the telephone number listed below.

Respectfully Submitted,



Scott B. Stahl
Reg. No. 33,795
Attorney for Applicant

Jackson Walker L.L.P.
2435 North Central Expressway, Suite 600
Richardson, Texas 75080
(972) 744-2933
(972) 744-2909 (Fax)

Encl.: Associate Power of Attorney